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CONTUINITY OF CARE FOR CANCER PATIENTS

Continuity of Care for Cancer Patients at

Irwin Army Community Hospital

Major Kay Hadley

U.S. Army-Baylor University

Graduate Program in Health and Business Administration

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Abstract

The care of cancer patients is often complex and uncoordinated resulting in poor patient handoffs and delays in care (Byers et al., 1999). This study examined the association between provider continuity and patients with cancer enrolled to Irwin Army Community Hospital, Fort Riley, Kansas. Descriptive statistics were performed for all 118 cancer patients and a more in depth analysis was conducted on the subset of 44 breast cancer patients. The Modified Modified Continuity Index (MMCI) was selected to measure continuity of care. The mean score for the 118 patients was 0.59 signifying a moderate level of continuity. The breast cancer group mean was 0.58. Three predictors, outpatient visits, hospital readmissions and emergency room visits, accounted for 17.1 % of the variance in the MMCI scores of Breast Cancer patients. The overall study was not significant ($p = .055$) but there was statistical differences in Ethnicity ($p < .05$) and years with cancer ($p < .01$) in relation to the MMCI scores. The small number of subjects in this study was a limitation and the use of categorical data, may have sacrificed some level of detail in the data.

Continuity of Care for Cancer Patients at Irwin Army Community Hospital

Continuity of care is an important part of the health care process. When correctly done, it offers an experience connected and coherent. In theory, it should ensure that the patient's plan of care passes from one visit to the next (Starfield, 1980). This connection depends upon provider consistency, or involvement with a limited number of providers. In addition, these providers must be consistently available and aware of the patient's medical history. This in turn facilitates the goal of continuity to improve the patient's problems and facilitate efficiency in diagnostic workup and management (Haggerty et al., 2003).

Continuity of care is an important management tool. Raddish, Horn, and Sharkey (1999) examined the association between provider continuity, utilization and expenditures. They collected data on patients with arthritis, asthma, epigastria pain, peptic ulcer disease, hypertension and otitis media from six health maintenance organizations. They found that as the number of primary or specialty care providers increased, there was an associated increase in costs.

Longstanding physician-patient ties result in less intensive medical care that in turn reduces the cost of care

(Weiss & Blustein, 1996). Established continuity of care is also linked with improved patient outcomes and decreased resource utilization and costs (De Maeseneer, De Prins, Gosset, & Heyerick, 2003). Other documented benefits include a reduction in the number of hospitalizations per patient, improved compliance with follow-up appointments, increased patient satisfaction, compliance with recommended care and a reduction in the duplication of tests (Burge, Lawson, & Johnston, 2003). Mainous, Kern, et al. (2004) found evidence this practice helps reduce the likelihood of future hospitalizations and Emergency Department use. For military hospital command groups, continuity is a potential mechanism to contain expenditures while promoting patient care and outcomes.

Continuity of care is associated with many of these qualities and measurable. Four of the continuity measures mentioned in the literature are the Usual Provider of Care (UPC), Continuity of Care (COC), Modified Continuity Index (MCI) and the Modified Modified Continuity Index (MMCI).

Conditions Which Prompted Study

In October 2004, the military health plan transitioned to the Next Generation of the TRICARE contract. Although the basic benefit structure remained unchanged, some of the benefit plan responsibilities transferred from the TRICARE contractor to the

Military Treatment Facility (MTF). The revenue once paid to the contractor began going to the MTF, who in turn paid the contractor for services received by beneficiaries in the network. This change provided incentive for the MTF to develop measurable performance guidelines for best practices, customer service, quality care, and access (TRICARE, 2003). This also allowed the flexibility to offer in-house or network services based on the cost effectiveness.

With changes in funding, the question of cost control became more important. From a clinical perspective, it raised a question: could changes in clinical practice have a positive impact for both the patient and the financial bottom line? Would improvements in the continuity of care have a positive impact in a military environment? As the Baylor resident in Health Administration at Irwin Army Community Hospital (IACH), Fort Riley, Kansas, with guidance from my preceptor, LTC Josh Kimball, I developed the following research questions.

Statement of the Research Questions

Research Question 1: Which continuity measure based on a review of the literature most accurately (conforming to the accepted standard found in the literature review) measures continuity of care (UPC, COC, MCI, and MMCI)?

Research Question 2: Do IACH providers offer continuity to all cancer patients?

Research Question 3: To what extent do outpatient visits, readmissions, and ER visits predict MMCI scores in breast cancer patients?

Research Question 4: What relationships exist between the MMCI scores with age, gender, ethnicity, and length of disease of breast cancer patients?

Research Question 5: Does the stage of cancer predict MMCI scores in the breast cancer group?

Literature Review

Volpe (1994) defined continuity as the physician's ability to understand interrelationships connected to the patient's illness. Mainous, Baker, Love, Pereira Gray, and Gill (2001) expanded on this concept and suggested efforts to improve continuity may not only improve the quality of care but outcomes of care. Saultz and Lochner (2005) found a relationship between interpersonal continuity and positive care outcomes. In their research of breast cancer patients in remission, Grunfeld et al. (1999) found higher levels of satisfaction with their delivery of care when seen by their regular physician than with follow-up by a specialist.

The literature supports the connection of interpersonal

continuity and positive outcomes. Unfortunately, the delivery of care to cancer patients is usually complex and uncoordinated, caused by multiple handoffs between providers and made worse by delays in care (Byers et al., 1999). These developments are associated with poor health outcomes or even death (Weyrauch, 1996).

Voices of a broken system: Real people, real problems, (President's Cancer Panel Report 2000-2001, 2001) indicated that there were barriers to quality care for cancer patients. These obstacles include inadequate cancer training for general practitioners, poor management of cancer-related symptoms and lack of timely referrals. Many patients do not receive appropriate medical care because of their geographical location.

These conditions caused the loss of public confidence in the health care system dealing with cancer patients. The National Cancer Policy Board (1999) responded by conducting a review of the effectiveness of cancer services. In their book *Ensuring the Quality of Cancer Care* they describe their findings as "ad hoc and fragmented cancer care system that did not ensure access to care, lacked coordination, and is inefficient in its use of resources" (p. 2).

Haggerty et al. (2003) found, for patients and their families, the experience of continuity of care is the perception

that providers know them and their past medical history. Patients and families expect mechanisms to be in place to effectively and cohesively evaluate their illness, despite numerous episodes of care and multiple providers, and that the health care community will agree upon their plan of care. The patients anticipate good communication, shared decision making, cultural sensitivity, and medical care provided with current knowledge, competency, and with appropriate services.

For providers, the experience of continuity includes establishing a relationship with a patient that allows for individualized treatment. Providers also perceive that this concept extends to consulted specialists, who will enhance, yet still pursue the original care plan (Haggerty et al., 2003).

Research supports the importance of continuity of care in the health care process, yet the definition of continuity of care is not clear. In a review of 379 articles, Saultz (2003) found 142 different definitions. The book by the Committee on Quality of Health Care in America (2001), *Crossing the quality chasm,* defined continuity of care in the context of quality health care as "good to the extent it increases the likelihood of desired outcomes. It is consistent with current professional knowledge while also providing patients with the appropriate services in a technically competent manner, good communication,

shared decision-making and cultural sensitivity" (p. 6).

The health care field recognizes the importance of continuity of care. However, different methods are cited within the literature for measuring continuity of care. The Usual Provider of Care (UPC), Continuity of Care (COC), Modified Continuity Index (MCI), and the Modified Modified Continuity Index (MMCI) are the four measurements most frequently mentioned in the literature.

A study by Magill and Senf (1987) compared the UPC, COC and MCI. They collected data on 201 patients. The patients made 1,154 visits to physicians over a two-year period. Fifty-nine percent were female; the average age was 28 with a range of 1 year up to 80. Sixty-five percent had an assigned provider. Twenty-six percent of the patients had all encounters with the same physician. The authors felt the previous measurement tools did not accurately represent the connection between numbers of providers seen and total number of visits. They compared the three tools and developed a new model.

The analysis of the first measurement tool, UPC, determined it oversimplified the relationship between patient and provider. UPC is simply a ratio, determined by limiting the visits to highest number of visits to one provider divided by the total number of providers. The UPC produces a measure that ranges from

zero to one. A score of zero represents that the patient made all his or her visits to different providers, and a score of one represents he or she made all visits to the same provider.

The UPC formula is as follows:

$$V/P_r \quad (1)$$

V = Total number of Visits

P_r = Total number of Providers

For example, if a patient has eight visits, (four visits to one physician and four visits to four other providers), the calculated UPC is 0.8 (4/5). Magill and Senf (1987) found the UPC does not accurately account for the total number of visits.

The second measure examined was Continuity of Care.

The COC formula is as follows:

$$COC = [(P_r)^2 + (P_r)^2 + (P_r)^2 + (P_r)^2 + (P_r)^2)-V]/[V\ (V-1)] \quad (2)$$

V = Total number of visits

P_r = Numbers of visits to provider

This formula attempts to account for visits to individual physicians. For example, if a patient has eight visits, four visits to a specific physician and the remaining four, each to different providers, COC would be 0.214 while the UPC would be 0.8. The COC also produces a measure that ranges from zero to one. A score of zero represents that the patient made all his or her visits to different providers, and a score of one represents

he or she made all visits to the same provider. Magill and Senf (1987) found the COC does not accurately account for total number of visits. Additionally, the COC score falls rapidly as the patient is required to see more providers.

Godkin and Rice (1984) developed another measure for assessing continuity of care. The MCI takes into consideration the total number of visits and total number of providers seen, but does not weight the visits per provider.

The formula for MCI is as follows:

$$MCI = 1-(P_r \text{ of providers} / [V \text{ of visits} + 0.1]) \quad (3)$$

V = Total number of visits

P_r = Numbers of visits to provider

This measure also generates a continuity of care score of zero to one. A score of zero represents that the patient made all his or her visits to different providers, and a score of one represents he or she made all visits to the same provider. Again, using a patient with eight visits, four visits to the same provider and the remaining four to four different providers; UPC=0.8, COC=0.214 and the MCI=0.38.

While Magill and Senf (1987) did find the MCI sensitive to a larger numbers of providers, it did not reflect the relationship of total providers to the total number of visits. These shortcomings prompted Magill and Senf to develop the

Modified Modified Continuity Index (MMCI). This measurement tool derives from the MCI but produces a measure that takes into account multiple visits per provider. A score of zero represents that the patient made all his or her visits to different providers, and a score of one represents he or she made all visits to the same provider.

The MMCI formula is as follows:

$$MMCI = 1-(P_r / [V + 0.1]) / 1-(1 / [V + 0.1]) \quad (4)$$

V = Total number of visits

P_r = Numbers of visits to providers

Again, using a patient with eight visits, four visits to the same provider and the remaining four to four different providers; the UPC = 0.80, COC=0.214, MCI=0.38 and the MMCI of 0.44. The MMCI produces a more reliable interpretation of continuity of care because it better accounts for the internal variance created by the volume of visits, the number of visits seen per provider, and the number of providers (Magill & Senf, 1987).

A review of more recent research indicates the MMCI remains the standard for measuring continuity of care. Gill, Mainous and Nsereko (2000) compared the MMCI with the UPC on a large dataset of MEDICAID claims. They found the UPC to be a simple ratio that did not account for the scattering of visits among multiple

providers, while the MMCI better accounted for the degree of dispersion among different providers. They concluded the higher degree of continuity of care, as measured by the MMCI, resulted in lower Emergency Department use and possibly reduced health care costs.

The Burge, Lawson and Johnston (2003) study used the MMCI to measure continuity of care. They used descriptive statistics, followed by negative binomial regression, to assess the association between continuity of care and the total number of Emergency Department visits. Because of the skewed distribution of the continuity of care scores, they were categorized as being low (scores < 0.5), medium (scores 0.5 to < 0.8), and high (scores 0.8 and greater). The continuity of care scores ranged from low 0.02-0.47(8.1%), moderate 0.50-0.79(35.6%) and high 0.80-1.00 (56.4%).

Purpose (Variables/Hypothesis)

Identify the continuity measure that best represents the relationship of the total number of visits to the total number of providers seen. Utilize that measurement to determine the continuity scores of the cancer patients and the breast cancer subgroup. Explore the different relationships between the scores, the number of hospitalizations, emergency department, and outpatient visits.

H_0: The current IACH process does not provide continuity of care to all cancer patients, including breast cancer patients.

H_{a1}: The current IACH process does provide continuity of care to all cancer patients, including breast cancer patients.

Methods and Procedures

The majority of IACH's beneficiaries reside within the Fort Riley, Manhattan and Junction City, Kansas zip codes. The participants for this study came from The Automated Central Tumor Registry database (ACTUR). To be included, each patient needed to have at least four outpatient visits related to their cancer from the date of their initial diagnosis. The time for the study extended from January 1995 to February 2004. Additional data came from the Composite Health Care System (CHCS) for the number of visits related to the cancer diagnosis. The demographic information included: beneficiary status (CHCS), (20=active duty/retirees, 30=all dependents), age at diagnosis (ACTUR), gender (ACTUR), and ethnicity (ACTUR).

Study Design

Review of the literature helped formulate the design for this study. This is a retrospective study and verbal permission from Irwin Army Community Hospital's Tumor Registrar was

received prior to using the ACTUR database to obtain the information for the analysis. The data collection from the ACTUR included: diagnosis, date of diagnosis, length of years with the disease, stage of disease at diagnosis (See Appendix A for coding) and current documented "evidence" or "no evidence" of the disease. The Composite Health Care System (CHCS) data provided the number of providers seen, total visits to a physician (or physicians) from the initial diagnosis, hospitalizations from the initial diagnosis, and visits to the Emergency Department from the initial diagnosis. Each subject had a MMCI score calculated. The score indicated the degree of continuity of care from January 1995 to February 2004. To ensure the consistency, accuracy, and reliability of the data, the researcher submitted data to the tumor registrar for review.

The following assumptions were made:

1) All patients were an Active Duty military service member, a military dependent, a military retiree or a government service employee.
2) All patients lived within the IACH catchment area.
3) All patients had transportation to the hospital.
4) All patients were able to obtain appointments.

The dataset was analyzed using Statistical Package for Social Sciences (SPSS), version 11.5. Descriptive analysis

identified the characteristics and associations among the variables and measured cause and effect among the variables (Cooper & Schindler, 2001). A descriptive statistical analysis was performed on the 118 cancer subjects. Regression was limited to the largest subset: the 44 breast cancer patients. Stevens (1996) found "for a reliable regression equation, 15 participants per predictor are needed" (p. 72). Three predictors (outpatient visits, readmissions, and ER visits) were used for this study. The 44 breast cancer participants allowed for 96.6% of the recommended number.

Results

The ACTUR database consisted of 118 total patients, 41 (34.7%) were male and 77 (65.3%) were female. All patients (n = 118) had at least four visits to IACH and were included in the analysis. Eighty-eight (74.6%) were identified as "Caucasian" and 30 (25.4%) as "Other." Of these patients, 42 (35.6%) listed active duty or retired status, while 76 (64.4%) were dependents. The mean MMCI score for this group was 0.59, which by definition signified a moderate level of continuity of care. Table 1 presents the minimum, maximum, mean and standard deviations by age, years of cancer, number of visits, number of providers, ER visits, hospital days (HD), Total Providers (TP), Total visits

(TV), MMCI and evidence of cancer. Table 2 presents the frequency and percent of subjects by stage.

Of the initial population of cancer patients (n = 118), this study examined the breast cancer (n = 44) group to further observe relationships between the variables. Thirty-five (77.3%) were identified as "Caucasian" and nine (22.7%) as "Other." The minimum, maximum, mean and standard deviations by age, years of cancer, and number of visits, number of providers, ER visits, HD, TP, TV, MMCI and evidence of cancer are presented in Table 3. The mean MMCI score (0-1) for the 44 breast cancer patients was 0.58. Table 4 represents the frequency and cancer stage of the 44 patients with Breast Cancer. Two patients (4.5%) were found to have evidence of existing cancer, while 42 (95.5%) were listed as being currently free of cancer.

The first research question examined which continuity of care measure, based on an assessment of the literature, most accurately measured continuity of care. The UPC is a simple ratio that does not emphasize the total number of doctors seen. The COC measurement did not accurately account for the total number of visits and fell rapidly with a large increase in providers. While the MCI did not accurately represent the relationship between total providers and total visits, the MMCI did accurately represent large numbers of providers and visits

(Burge et al., 2003; Gill et al., 2000; Magill & Senf, 1987).

An example from Appendix A demonstrates the differences. The UPC was 0.50, the COC was 0.17, the MCI was 0.27 and the MMCI was 0.36 for the same patient with four visits to three different providers (2, 1, and 1). Therefore, the UPC overinflated the level of care continuity, the COC and MCI produced scores that were too low, while the MMCI seemed to more closely represent the ratio of the number of providers to number of visits. The same was true for a patient with five visits to three different providers (2, 2, and 1). The UPC was 0.40, the COC score was 0.20, the MCI score was 0.41, and the MMCI score was 0.51. The UPC, MCI, and COC scores were too low, while the MMCI more accurately represented the relationship between the visits provided and physicians seen. Based on the review of the literature and the results from Appendix A, the MMCI is the measurement that most accurately represents continuity of care for this research.

The second research question examined the extent IACH health care providers rendered continuity of care to their cancer patients. This study utilized the following definitions listed by the Burge et al. (2003) research. A MMCI score of less than 0.50 indicated patients who were experiencing low continuity. A MMCI score of 0.50-0.79 indicated moderate

continuity and a score of 0.80 or greater indicated high continuity of care for patients.

The researcher for this project used the findings from the literature to calculate the continuity of care for each IACH cancer patient. IACH cancer patients with MMCI scores of less than 0.50 were receiving low continuity of care. IACH cancer patients with scores between 0.50 and 0.79 were receiving moderate levels of continuity of care and those IACH cancer patients with MMCI scores of 0.80 or greater were receiving high continuity of care.

Each subject (n = 118) had a MMCI score calculated. The definition for continuity of care for this study is a MMCI score of 0.50 or greater. Each subject needed to have at least four visits with a provider at IACH between January 1995 and February 2004. All 118 participants in the study had at least four provider visits. A qualifying provider visit was limited to a physician, nurse practitioner or physician assistant. Qualifying visits did not include treatments, diagnostic testing, or therapy. Both provider and visit data was verified for accuracy by the researcher and the Tumor Registrar. Table 3 shows that the mean MMCI score for breast cancer patients was 0.58 (*SD* = 0.22). Therefore, breast cancer patients were receiving moderate levels of continuity of care.

The third research question examined the extent to which outpatient visits, readmissions, and ER visits predict breast cancer MMCI scores. A multiple regression examined the extent to which the independent variables of outpatient visits, readmissions, and ER visits predicted the dependent variable of MMCI scores. The assumptions of regression included: no multi-collinearity (i.e., the independent variables were not highly correlated), linear relationships between variables (the collection of data can be described as a straight line), and homoscedasticity of the data (data evenly dispersed both above and below the regression line, Cooper & Schindler, 2001).

In terms of the assumptions mentioned above, standard scores were calculated for MMCI scores and no outliers were noted. Multi-collinearity was assessed using the variance inflation factor (VIF) statistic. A high VIF score is an indicator that the assumption of no multi-collinearity was not met (Cooper & Schindler, 2001). The VIF scores for the independent variables (outpatient visits [OPV], hospital readmissions [RA] and emergency department visits [EDV]) were all below 2.0, suggesting that the assumption of no multi-collinearity was satisfied.

The three predictors (OPV, RA, and EDV), accounted for 17.5% of the variance in MMCI scores, and the model was nearly

significant, F (3, 40) = 2.83, p = .051. Table 5 shows that for each 1-unit increase in OPV, MMCI scores increased by .004 units. Therefore, patients with a greater number of OPV also tended to have higher levels of continuity of care.

The fourth research question examined the breast cancer group's (n = 44) relationships between MMCI score with age, ethnicity (coded as 1 for "Caucasian" and 2 for "Other"), years with cancer, and years seen by the health care provders for cancer. Table 6 shows the correlation coefficients, indicating ethnicity (r = -.32, p < .05) and years with cancer (r = -.40, p < .01) were statistically significant with negative correlations. The negative relationship with ethnicity indicates that "Caucasian" women tended to have higher MMCI scores than "Other" women. The negative relationship of MMCI scores with years of cancer signifies that as the total time with cancer increases, the MMCI scores decrease, suggesting less provider continuity of care over longer periods of time.

The fifth research question examined if the stage of cancer predicted MMCI scores in the breast cancer patients. Breast cancer patients in either Stage 2 or 3 were collapsed into a single category because there were only two Stage-2 patients. The assumptions of normality were met, and Levene's test did not reject the null hypothesis of homogeneity of variance among the

three groups. The ANOVA calculation was not statistically significant, F (2, 41) = .01, *ns*. All three groups had similar MMCI scores (Stage 0 M = 0.57, SD = 0.15; Stage 1 M = 0.58, SD = 0.23; Stage 2/3 M = 0.59, SD = 0.23). These results thus suggest that there was no relationship between the stage of breast cancer and the level of continuity of care (as measured by the MMCI) in breast cancer patients.

Ethical Considerations

The ethical conduct in this study was always a priority to ensure the benefits of the research not be overshadowed by inappropriate data collection or disclosure of patient-specific data. Patient identity was confidential at all times.

Discussion

The first research question examined which continuity of care measure, based on an assessment of the literature, most accurately measures continuity of care. The UPC, COC, MCI, and the MMCI are the measurements most frequently found in the literature for measuring continuity of care. The researcher built a table (Appendix A) to view how the research from the literature determined the MMCI score is the best measure of continuity of care. The actual calculations, based upon fictitious data, help demonstrate how the UPC consistently overinflates continuity scores because it does not accurately

account for the total number of visits. The data also show how the COC and MCI measures skew low with an increasing number of providers seen, regardless of the number of visits with a specific provider. Godkin and Rice (1984) developed the MCI because of the shortcomings of the UPC and COC. The MCI calculation did take into consideration the total number of visits and total number of providers seen. However, it did not weigh the visits per provider. This resulted in an answer sensitive to a large number of providers, but did not reflect the relationship of total providers to the total number of visits.

Magill and Senf (1987) found the UPC, COC and MCI ignored key aspects of continuity or provided misleading results. They established that the UPC oversimplifies the relationship between the patient and provider. They also found COC did not accurately account for the total number of visits and the scores fall rapidly with each additional provider seen. This led them to develop the MMCI that more accurately represented continuity.

Gill et al. (2000) used the MMCI for their study of 11,474 Delaware Medicaid patients. They chose the MMCI because it accounts for the degree of dispersion among different providers. The data in Appendix A demonstrates how the MMCI best represents the number of providers to number of visits.

The second research question examined to what extent IACH health care providers rendered continuity of care to their cancer patients. Continuity of care was defined, based upon the literature, as a MMCI score of 0.50 or greater (Burge et al., 2003). Table 3 shows that the mean MMCI score for breast cancer patients (n = 44) was 0.58 (SD = 0.22). Therefore, breast cancer patients received a moderate level of continuity of care.

Gill et al. (2000) also used the MMCI in their research because they felt it better accounted for the degree of dispersion among different providers. When they compared the UPC and the MMCI, they found the UPC is not as sound because it does not account for the scattering of visits among providers. They also used the range of 0 to 1 for the MMCI scores. Their mean continuity score was 0.6.

The third research question examined the extent to which OPV, RA, and EDV predict breast cancer MMCI scores. A multiple regression examined the extent to which the independent variables of OPV, RA, and EDV predicted the dependent variable, MMCI scores. The three predictors outpatient visits, hospital readmissions and emergency department visits, accounted for 17.1% of the variance in MMCI scores. The model itself was marginally significant, F (3, 40) = 2.75, p = .055. Table 5 shows that OPV were a significant predictor of MMCI scores. It

is important to note that visits are a major component of building the MMCI score. That the model ended up being close to statistically significant may be the result of how the MMCI score is determined rather than an actual finding. However, it is also important to note that higher MMCI scores also require a grouping of visits with a single provider or a small number of providers. Therefore, the result cannot be ignored. This project does not have sufficient additional information to fully explore this possibility.

Gill et al. (2000) examined the effect of Emergency Department (ED) use on continuity of care utilizing the MMCI to measure continuity. They used a sample of Delaware Medicaid claims from July 1, 1993 to June 30, 1994. This included 11,474 patients aged 4 to 64. They found continuity is associated with a lower likelihood of a single ED visit (odds ratio = 0.82; 95% confidence interval = 0.70-0.95), and even more strongly associated with a lower likelihood of making multiple ED visits (odds ratio = 0.65; 95% confidence interval = 0.56-0.76).

The fourth research question examined the breast cancer group's relationships between MMCI score with age, ethnicity, years with cancer, and years seen. Table 6 shows the correlation coefficients, where ethnicity ($p < .05$) and years with cancer ($p < .01$) were statistically significant with negative

correlations. The surprising, and statistically significant, finding that "Caucasian" women tended to have higher levels of continuity of care is concerning. This suggests that "Caucasian" women possibly receive better care. Further review of the data indicated that Black, Japanese, and Vietnamese women all showed much lower MMCI scores than the Caucasian women. However, the small number of Korean women had MMCI scores slightly better than the Caucasian women. The small number in each of the different ethnicity groupings makes it difficult to make any major predictions. A larger study may have allowed greater review of this variable and may have resulted in a different finding.

The negative relationship of MMCI scores with years of cancer indicate that as the total time with cancer increases, the MMCI scores decrease, suggesting less provider continuity of care occurs over longer periods of time. This may be explainable because the military providers move often and deploy, although this study did not collect sufficient data to examine it. The negative relationship of MMCI scores with years of cancer indicate that as the total time with cancer increases, the MMCI scores decreases should be examined in a civilian setting. The continual movement of military physicians may well have influenced the negative relationship.

The fifth research question examined if the stage of cancer predicted MMCI scores in the breast cancer patients. No evidence of an association between stage of cancer and MMCI score was found. The small number of subjects in this study may not show associations found in a larger study. Additionally, the use of categorical data optimized manageability, but also sacrificed the details of that data.

Hansen (1975), as well as Schers et al. (2002), suggested that patients with chronic diseases require a higher degree of continuity of care. Hansen suggested age may influence continuity of care because older groups tend to have more severe long-term chronic problems. The correlation in this study between years of breast cancer to MMCI scores was significant ($r = -.40$, $p < .01$, Table 6).

The negative relationship between MMCI scores and years of cancer indicate that as the total time with cancer increases, the MMCI scores decrease, suggesting less provider continuity of care occurs over longer periods. These results are thus concerning, as they suggest that patients with long-term problems tend to have lower levels of continuity of care, in contrast with the aforementioned recommendation of Hansen and Schers et al.

Conclusions

One hundred and eighteen patients, 41 (34.7%) males and 77 (65.3%) females, were initially included in this study. Eighty-eight (74.6%) were identified as Caucasian and 30 (25.4%) as "other." Of these patients, 42 (35.6%) had active duty or retired status, while 76 (64.4%) were dependents to include children.

Of the initial sample, 44 women with breast cancer were examined. Thirty-four (77.3%) were identified as "Caucasian" and 10 (22.7%) as "Other." In terms of evidence of cancer, 42 (95.5%) had evidence, while two (4.5%) did not. The mean MMCI score for breast cancer patients was .58 (SD = 0.22). Therefore, a moderate level of continuity of care was provided to these patients.

The second research question examined to what extent outpatient visits, readmissions, and ER visits predicted MMCI scores in breast cancer patients. The three predictors accounted for 17.1% of the variance in MMCI scores, however the model was not significant, F (3, 40) = 2.75, p = .055. Outpatient visits were a significant predictor of MMCI scores.

The third research question examined the relationships between MMCI score with age, race, years with cancer, and years seen. The data indicate that Caucasian women had greater levels

of continuity of care than other women (Table 6). Additionally, the longer a patient was being tracked, the lower the level of continuity of care.

The fourth research question examined if differences existed in MMCI scores by stage (0 vs. 1 vs. 2/3). The ANOVA was not statistically significant, F (2, 41) = .01, *ns*. All three groups had similar MMCI scores: Stage 0 (M = 0.57, SD = 0.15), Stage 1 (M = 0.58, SD = 0.23), Stage 2/3 (M = 0.59, SD = 0.23).

The fifth research question examined if the stage of cancer predicted MMCI scores in the breast cancer patients. The research did not find any statistical significance.

Recommendations

This research offers as a framework for a larger study. The Department of Defense Automated Tumor Registry (ACTUR) provides instruction on how to obtain cancer data for military treatment facilities with CHCS to obtain cancer data. Replicating this study in a larger military medical treatment center would provide a larger sample giving more power to strengthen relationships explored in this study.

Further research should also be directed at examining more closely two concerning findings of this study: (a) the relationship between ethnicity and continuity of care, and (b) the negative relationship between years with cancer and

continuity of care. The reasons why Caucasian women tend to have higher levels of continuity of care than women of other ethnicities should be examined. Although this study found a relationship between ethnicity and continuity of care, the data collected did not allow for an investigation of the reasons for this phenomenon.

An explanation should also be sought for the negative relationship between years of cancer and continuity of care. Given that patients with chronic diseases require a higher degree of continuity of care (Hansen, 1975; Schers et al., 2002), further research should be directed at determining why the opposite relationship was observed in the present study.

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Appendix A

Components of Continuity Formulas and Score Comparison

Pr		V	DV	UPC	COC	MCI	MMCI
1	2	2	1.00	1.00	0.52		1.00
2	2	1,1	0.50	0.00	0.05		0.10
1	3	3	1.00	1.00	0.68		1.00
2	3	2,1	0.67	0.33	0.35		0.51
3	3	1,1,1	0.33	0.00	0.03		0.04
1	4	4	1.00	1.00	0.76		1.00
2	4	3,1	0.75	0.50	0.51		0.67
2	4	2,2	0.50	0.33	0.51		0.67
3	4	2,1,1	0.50	0.17	0.27		0.36
4	4	1,1,1,1	0.25	0.00	0.02		0.03
1	5	5	1.00	1.00	0.80		1.00
2	5	4,1	0.80	0.60	0.61		0.76
2	5	3,2	0.60	0.40	0.61		0.76
3	5	3,1,1	0.60	0.30	0.41		0.51
3	5	2,2,1	0.40	0.20	0.41		0.51
4	5	2,1,1,1	0.60	0.10	0.22		0.28
5	5	1,1,1,1,1	0.20	0.00	0.02		0.03

Note. Scores Range from 0-1. Pr = Number of Providers. UPC = Usual Provider of Care. MMCI = Modified Modified Index. V = Number of Total Visits. COC = Continuity of Care. DV = Division of Total Visits. MCI = Modified Care Index. Adapted from Magill & Senf (1987)

Appendix B

Staging and Code Numbers for Cancer

Coding Numbers	Extent of Cancer	Definitions
0	In situ	Presence of malignant cells within the cell group from which they arose
1	Localized	Malignancy limited to the organ of origin
2	Regional by direct extension only	Invasion through the wall of the organ and/or adjacent tissues
3	Regional lymph nodes only	Tumor invasion of walls of the lymphatic
4	Regional by both direct extension and lymph nodes involvement	A combination of both direct extension and lymph node involvement
5	Regional, not otherwise specified	Used if not clear about the tissue involved
7	Distant metastases	Tumor cells that break away from the primary tumor

Note. There is not a stage 6. Adapted from Young, Roffers, Ries, Fritz and Hurlbut, (2001)

Table 1

Minimum, Maximum, Mean and Standard Deviations for Each Variable (N = 118)

Variable	Minimum	Maximum	Mean	Standard Deviation
Age	7	87	52.58	15.08
Years Cancer	1	34	7.99	6.41
Visits	4	176	23.04	21.66
Providers	1	65	9.52	8.86
Year Seen	0	10	4.14	2.16
ER visits	0	230	3.87	21.24
HA	0	4	0.48	0.84
HD	1	30	5.68	6.60
TP	1	65	9.16	7.65
TV	4	176	22.97	21.27
MMCI	0	1	0.59	0.21
Evid. Cancer	1	2	1.14	0.34

Note. Abbreviations: ER = Emergency room visits, HA = Hospital admissions, HD = Hospital days, TP = Total number of providers seen, TV = Total number of visits, SD = Standard deviation, MMCI = Modified Modified Continuity Index

Table 2

Frequency and Percent of Staging for All Cancer Patients (N = 118)

Stage	Frequency	Percent
0	15	12.7%
1	59	50.0%
2	10	8.5%
3	18	15.3%
4	4	3.4%
5	1	0.8%
7	11	9.3%

Note. The staging number reflects the extent of the cancer within the body progressing from the least involvement to the most involvement within the body (Young et al., 2001).

Table 3

Minimum, Maximum, Mean and Standard Deviations for Each Variable for Breast Cancer Patients (n = 44)

Variable	Minimum	Maximum	Mean	Standard Deviation
Age	31	72	53.39	9.66
Visits	6	69	24.30	17.74
Provider	1	28	9.70	6.25
Years cancer	1	24	9.07	6.24
Years seen	0	8	4.09	1.93
Emergency room visits	0	13	2.16	3.21
Hospital admissions	0	4	0.48	0.85
Total hospital days	0	10	1.41	2.81
MMCI	0.12	1	0.58	0.22

Table 4

Breast Cancer Patients Frequency and Percent of Staging (n = 44)

Stage	Frequency	Percent
0	5	11.4%
1	27	61.4%
2	2	4.5%
3	10	22.7%

Note. As the cancer spreads, the stage of cancer increases (Young et al., 2001). The majority of the breast cancer patients at the time of this study experienced Stage 1 (61.4%).

Table 5

Regression: B, Standard Error (SE), Beta Weights, t, and Significance (Sig) Levels for Variables and MMCI for Breast Cancer (n = 44)

Variables	B	SE	Beta	t	Sig.	R^2	VIF
Outpatient visits	0.004	0.002	0.35	2.34	0.024	0.068	1.084
ER visits	-0.02	0.011	0.29	-1.9	0.061	0.056	1.115
Hospital RA	-0.02	0.012	0.23	-1.6	0.126	0.051	1.044

Note. The VIF scores for the independent variables outpatient visits, emergency room visits, and hospital readmissions were all below 2.0. The three predictors accounted for 17.5% of the variance in MMCI scores, and the model was nearly significant, F (3, 40) = 2.83, p = .051. Table 5 shows that for each 1-unit increase in outpatient visits, MMCI scores increased by .004 units.

Table 6

Correlation between MMCI Scores and Age, Ethnicity, Years with Cancer and Years Seen, for Breast Cancer Patients (n = 44)

Variable	*r*
Age	.09
Ethnicity	-.32*
Years Cancer	-.40**
Years Seen	-.03

Note. *p < .05. **p < .01